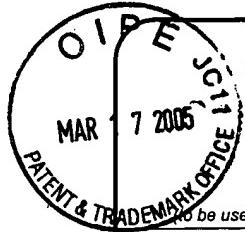


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2244

# TRANSMITTAL FORM



(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

|  |                  |
|--|------------------|
| Application Number                       | 09/851,940       |
| Filing Date                              | May 10, 2001     |
| First Named Inventor                     | Baraff, David E. |
| Art Unit                                 | 2671             |
| Examiner Name                            | Scott A. Wallace |
| Total Number of Pages in This Submission | 37               |
| Attorney Docket Number                   | 021751-002200US  |

## ENCLOSURES (Check all that apply)

|   |  |   |         |  |  |
|---|--|---|---------|--|--|
| <input type="checkbox"/> Fee Transmittal Form   | <input type="checkbox"/> Drawing(s)  | <input type="checkbox"/> After Allowance Communication to TC                            |         |  |  |
| <input type="checkbox"/> Fee Attached   | <input type="checkbox"/> Licensing-related Papers  | <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences     |         |  |  |
| <input type="checkbox"/> Amendment/Reply  | <input type="checkbox"/> Petition  | <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) |         |  |  |
| <input type="checkbox"/> After Final  | <input type="checkbox"/> Petition to Convert to a Provisional Application                | <input type="checkbox"/> Proprietary Information  |         |  |  |
| <input type="checkbox"/> Affidavits/declaration(s)  | <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address  | <input type="checkbox"/> Status Letter  |         |  |  |
| <input type="checkbox"/> Extension of Time Request  | <input type="checkbox"/> Terminal Disclaimer   | <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):         |         |  |  |
| <input type="checkbox"/> Express Abandonment Request  | <input type="checkbox"/> Request for Refund  | <input type="checkbox"/> Return Postcard;   |         |  |  |
| <input type="checkbox"/> Information Disclosure Statement   | <input type="checkbox"/> CD, Number of CD(s) _____                                       | <input type="checkbox"/> Application for Patent Term Adjustment Correction (3 pages);   |         |  |  |
| <input type="checkbox"/> Certified Copy of Priority Document(s)   | <input type="checkbox"/> Landscape Table on CD   | <input type="checkbox"/> Exhibit A (30 pages); and                                      |         |  |  |
| <input type="checkbox"/> Reply to Missing Parts/ Incomplete Application   |  | <input type="checkbox"/> Exhibit B (2 pages)  |         |  |  |
| <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53   |  |   |         |  |  |
| <table border="1"> <tr> <td>Remarks</td> <td colspan="2">The Commissioner is authorized to charge any additional fees to Deposit Account 20-1430.</td> </tr> </table> |  |   | Remarks | The Commissioner is authorized to charge any additional fees to Deposit Account 20-1430. |  |
| Remarks   | The Commissioner is authorized to charge any additional fees to Deposit Account 20-1430. |   |         |  |  |

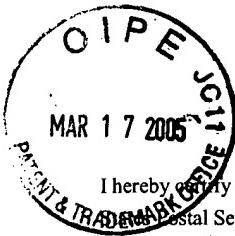
## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

|              |                                    |          |        |
|--------------|------------------------------------|----------|--------|
| Firm Name    | Townsend and Townsend and Crew LLP |          |        |
| Signature    | <i>S. B. Kotwal</i>                |          |        |
| Printed name | Sujit B. Kotwal                    |          |        |
| Date         | 03 - 14 - 2005                     | Reg. No. | 43,336 |

## CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

|                       |            |      |         |
|-----------------------|------------|------|---------|
| Signature             |            |      |         |
| Typed or printed name | TIFFANY WU | Date | 3/14/05 |

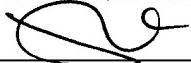


I hereby certify that this correspondence is being deposited with the United  
States Postal Service as first class mail in an envelope addressed to:

PATENT  
Docket No.: 021751-002200US

On 3/14/05

TOWNSEND and TOWNSEND and CREW LLP

By: 

Tiffany Wu

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

DAVID E. BARAFF et al.

Application No.: 09/851,940

Filed: May 10, 2001

For: GLOBAL INTERSECTION  
ANALYSIS FOR DETERMINING  
INTERSECTIONS OF OBJECTS IN  
COMPUTER ANIMATION

Examiner: Wallace, Scott A.

Art Unit: 2671

**APPLICATION FOR PATENT TERM  
ADJUSTMENT CORRECTION**

Box Petitions  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Applicant requests reconsideration of the patent term adjustment indicated in the Notice of Allowance dated December 16, 2004 received from the U.S. Patent and Trademark Office (USPTO).

The Notice of Allowance indicates a patent term adjustment of 214 days. Applicant submits that this is incorrect. Applicant believes the patent term adjustment should be 315 days. Presented below is Applicant's calculation basis for requesting a patent term adjustment of 315 days (calculated up to December 16, 2004--the date of mailing of the Notice of Allowance).

03/18/2005 RMBRAH1 00000178 201430 09851940  
01 FC:1455 200.00 DA

The PAIR information for this application indicates that the USPTO has subtracted 61 days and 101 days from the patent term adjustment period pursuant to 37 CFR 1.704. Applicant submits that the subtraction of the 101 days is in error. The USPTO has calculated the 101 days for an alleged delay in responding to a non-final Office Action (1st Office Action) dated July 21, 2003. The USPTO calculation alleges that the response to the non-final Office Action was filed on January 20, 2004 resulting in a 101 days delay.

Applicant however submits that a proper and timely response to the Office Action dated July 21, 2003 was filed via facsimile by the Applicant on October 21, 2003, i.e., within 3-months of the date of the Office Action. A copy of the response as filed is enclosed herewith as **Exhibit A**. The documents in **Exhibit A** comprise a Fax Cover Sheet which indicates that the documents were faxed on October 21, 2003. **Exhibit A** also comprises a Transmittal Form with a certification indicating that the documents were filed via facsimile on October 21, 2003. Also attached herewith is an Auto-Reply Facsimile Transmission sheet (see **Exhibit B**) received from the USPTO indicating that the faxed documents were received by the USPTO on October 21, 2003.

In light of the above, Applicant submits that a proper and timely response to the Office Action dated July 21, 2003 was filed on October 21, 2003. Accordingly, the delay caused by Applicant in responding to this Office Action under 37 CFR 1.704 is 0 days--not 101 days as calculated by the USPTO. Accordingly, the total days calculated under 37 CFR 1.704 should be only 61 days--and not 162 days.

The documents that were previously filed on October 21, 2003 were refaxed to the USPTO on January 30, 2004 per the Examiner's request. This date is however irrelevant to the calculation under 37 CFR 1.704.

Based upon the above, Applicant submits that as of December 16, 2004, the total patent term adjustment for this application should be 315 days (376-0-61), which is the difference between the sum of periods calculated under 37 CFR §1.703 (376 days) and the sum of periods calculated under 37 CFR §1.704 (61 days).

The instant application is not subject to any terminal disclaimer.

DAVID E. BARAFF et al.  
Application No.: 09/851,940  
Page 3

PATENT

Please deduct the processing fee of \$200.00, pursuant to 37 CFR §1.18(e),  
from Deposit Account No. 20-1430 of the undersigned, and charge any additional fees or  
credit overpayment to the above Deposit Account.

Respectfully submitted,

*S. B. Kotwal*

Sujit B. Kotwal  
Reg. No. 43,336

TOWNSEND and TOWNSEND and CREW LLP  
Two Embarcadero Center, Eighth Floor  
San Francisco, California 94111-3834  
Tel: (415) 576-0200  
Fax: (415) 576-0300  
SBK:ewm

60435567 v1

# **Exhibit A**

**ATTACHMENT A**

Atty Docket No. 21751-002200US

PTO FAX NO.: (703) 872-9314  
ATTENTION: Examiner Linzy T. McCartney  
TELEPHONE NO.: (703) 605-0745

Group Art Unit 2671

**OFFICIAL COMMUNICATION  
AMENDMENT, REVOCATION OF POWER OF  
ATTORNEY, POWER OF ATTORNEY, STATEMENT  
UNDER 3.73(B) FOR FOR ENTRY IN U.S. PATENT  
APPLICATION NO. 09/851,940, FILED MAY 10, 2001**

**FOR THE PERSONAL ATTENTION OF  
EXAMINER LINZY T. MCCARTNEY**

**CERTIFICATION OF FACSIMILE TRANSMISSION**

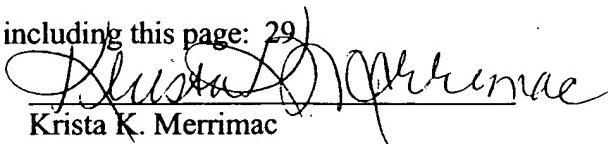
I hereby certify that the following document(s) in re Application of DAVID E. BARAFF et al., U.S. Application No. 09/851,940, filed May 10, 2001 for GLOBAL INTERSECTION ANALYSIS FOR DETERMINING INTERSECTIONS OF OBJECTS IN COMPUTER ANIMATION are being facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Document(s) Attached

1. SB/21 Transmittal Form (1 page)
2. SB/17 Fee (in duplicate) (2 pages)
3. Amendment (21 pages)
4. Revocation of Power of Attorney or Authorization of Agent (1 page)
5. Power of Attorney or Authorization of Agent (1 page)
6. Statement Under 3.73(b) w/ copy of Assignment as filed (2 pages)

Number of pages being transmitted, including this page: 29

Dated: October 21, 2003



Krista K. Merrimac

**PLEASE CONFIRM RECEIPT OF THIS PAPER BY RETURN FACSIMILE AT (650) 326-2422**

TOWNSEND and TOWNSEND and CREW LLP  
Two Embarcadero Center, 8th Floor  
San Francisco, CA 94111-3834  
Telephone: 650-326-2400 / Fax: 650-326-2422

**COPY**

|  |   |                        |                    |
|--|---|------------------------|--------------------|
| <b>TRANSMITTAL<br/>FORM</b><br><i>(to be used for all correspondence after initial filing)</i> |   | Application Number     | 09/851,940         |
|  |   | Filing Date            | May 10, 2001       |
|  |   | First Named Inventor   | Baraff, David E.   |
|  |   | Art Unit               | 2671               |
|  |   | Examiner Name          | Linzy T. McCartney |
| Total Number of Pages in This Submission   | 1 | Attorney Docket Number | 21751-002200US     |

| ENCLOSURES (Check all that apply)  |   |   |  |
|--|---|---|--|
| <input checked="" type="checkbox"/> Fee Transmittal Form<br><input type="checkbox"/> Fee Attached<br><br><input checked="" type="checkbox"/> Amendment/Reply<br><input type="checkbox"/> After Final<br><br><input type="checkbox"/> Affidavits/declaration(s)<br><br><input type="checkbox"/> Extension of Time Request<br><br><input type="checkbox"/> Express Abandonment Request<br><br><input type="checkbox"/> Information Disclosure Statement<br><br><input type="checkbox"/> Certified Copy of Priority Document(s)<br><br><input type="checkbox"/> Response to Missing Parts/ Incomplete Application<br><input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53 | <input type="checkbox"/> Drawing(s)<br><input type="checkbox"/> Licensing-related Papers<br><input type="checkbox"/> Petition<br><input type="checkbox"/> Petition to Convert to a Provisional Application<br><input checked="" type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address<br><input type="checkbox"/> Terminal Disclaimer<br><input type="checkbox"/> Request for Refund<br><input type="checkbox"/> CD, Number of CD(s) | <input type="checkbox"/> After Allowance Communication to Group<br><input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences<br><input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)<br><input type="checkbox"/> Proprietary Information<br><input type="checkbox"/> Status Letter<br><br><input checked="" type="checkbox"/> Other Enclosure(s)<br><i>(please identify below):</i><br><br>Power of Attorney, Statement Under 3.73(b) w/<br>copy of Assignment as originally filed;<br>Certification of Facsimile Transmittal |  |
|  |   | Remarks   |  |
|  |   | The Commissioner is authorized to charge any additional fees to Deposit Account 20-1430.  |  |
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**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT**

|                    |   |                 |
|--------------------|---|-----------------|
| Firm or Individual | Townsend and Townsend and Crew LLP<br>Sujit B. Kotwal | Reg. No. 43,336 |
| Signature          | <u>S.B. Kotwal</u>                                    |                 |
| Date               | October 21, 2003                                      |                 |

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being facsimile transmitted to the Patent and Trademark Office, Fax No. (703) 872-9314 on October 21, 2003.

|                       |                            |
|-----------------------|----------------------------|
| Typed or printed name | Krista K. Merrimac         |
| Signature             | <u>Krista K. Merrimac</u>  |
|                       | Date      October 21, 2003 |

60065340 v1

**COPY**

# FEE TRANSMITTAL

## for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

 Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$)

194

Complete if Known

|                      |                    |
|----------------------|--------------------|
| Application Number   | 09/851,940         |
| Filing Date          | May 10, 2001       |
| First Named Inventor | Baraff, David E.   |
| Examiner Name        | Linzy T. McCartney |
| Art Unit             | 2671               |
| Attorney Docket No.  | 21751-002200US     |

## METHOD OF PAYMENT (check all that apply)

Check    Credit Card    Money Order    Other    None  
 Deposit Account:

Deposit Account Number

20-1430

Deposit Account Name

Townsend and Townsend and Crew LLP

## The Director is authorized to: (check all that apply)

- Charge fee(s) indicated below    Credit any overpayments  
 Charge any additional fee(s) or any underpayment of fee(s)  
 Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

## FEE CALCULATION

## 1. BASIC FILING FEE

Large Entity   Small Entity

| Fee Code (\$) | Fee | Fee Code (\$) | Fee Description           | Fee Paid |
|---------------|-----|---------------|---------------------------|----------|
| 1001          | 770 | 2001          | 385 Utility filing fee    |          |
| 1002          | 340 | 2002          | 170 Design filing fee     |          |
| 1003          | 530 | 2003          | 265 Plant filing fee      |          |
| 1004          | 770 | 2004          | 385 Reissue filing fee    |          |
| 1005          | 160 | 2005          | 80 Provisional filing fee |          |

SUBTOTAL (1)

(\$)

## 2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

|                    |    | Fee from below           | Fee Paid |
|--------------------|----|--------------------------|----------|
| Total Claims       | 30 | -24** = 6 X \$18 = \$108 |          |
| Independent Claims | 7  | -6** = 1 X \$86 = \$86   |          |
| Multiple Dependent |    | X _____                  |          |

Large Entity   Small Entity

| Fee Code (\$) | Fee | Fee Code (\$) | Fee Description  |
|---------------|-----|---------------|--|
| 1202          | 18  | 2202          | 9 Claims in excess of 20                                     |
| 1201          | 86  | 2201          | 43 Independent claims in excess of 3                         |
| 1203          | 290 | 2203          | 145 Multiple dependent claim, if not paid                    |
| 1204          | 86  | 2204          | 43 ** Reissue independent claims over original patent        |
| 1205          | 18  | 2205          | 9 ** Reissue claims in excess of 20 and over original patent |

SUBTOTAL (2)

(\$)194

\*\*or number previously paid, if greater; For Reissues, see above

## FEE CALCULATION (continued)

## 3. ADDITIONAL FEES

| Large Entity              | Fee Code (\$) | Fee  | Fee Description   | Fee Paid |
|---------------------------|---------------|------|---|----------|
| 1051                      | 130           | 2051 | 65 Surcharge - late filing fee or oath  |          |
| 1052                      | 50            | 2052 | 25 Surcharge - late provisional filing fee or cover sheet                     |          |
| 1053                      | 130           | 1053 | 130 Non-English specification   |          |
| 1812                      | 2,520         | 1812 | 2,520 For filing a request for reexamination                                  |          |
| 1804                      | 920*          | 1804 | 920* Requesting publication of SIR prior to Examiner action                   |          |
| 1805                      | 1,840*        | 1805 | 1,840* Requesting publication of SIR after Examiner action                    |          |
| 1251                      | 110           | 2251 | 55 Extension for reply within first month                                     |          |
| 1252                      | 420           | 2252 | 210 Extension for reply within second month                                   |          |
| 1253                      | 950           | 2253 | 475 Extension for reply within third month                                    |          |
| 1254                      | 1,480         | 2254 | 740 Extension for reply within fourth month                                   |          |
| 1255                      | 2,010         | 2255 | 1,005 Extension for reply within fifth month                                  |          |
| 1401                      | 330           | 2401 | 165 Notice of Appeal  |          |
| 1402                      | 330           | 2402 | 165 Filing a brief in support of an appeal                                    |          |
| 1403                      | 290           | 2403 | 145 Request for oral hearing  |          |
| 1451                      | 1,510         | 1451 | 1,510 Petition to institute a public use proceeding                           |          |
| 1452                      | 110           | 2452 | 55 Petition to revive – unavoidable   |          |
| 1453                      | 1,330         | 2453 | 655 Petition to revive – unintentional  |          |
| 1501                      | 1,330         | 2501 | 655 Utility issue fee (or reissue)  |          |
| 1502                      | 480           | 2502 | 240 Design issue fee  |          |
| 1503                      | 640           | 2503 | 320 Plant issue fee   |          |
| 1460                      | 130           | 1460 | 130 Petitions to the Commissioner   |          |
| 1807                      | 50            | 1807 | 50 Petitions related to provisional applications                              |          |
| 1806                      | 180           | 1806 | 180 Submission of Information Disclosure Stmt                                 |          |
| 8021                      | 40            | 8021 | 40 Recording each patent assignment per property (times number of properties) |          |
| 1809                      | 770           | 2809 | 385 Filing a submission after final rejection (37 CFR § 1.129(a))             |          |
| 1810                      | 770           | 2810 | 385 For each additional invention to be examined (37 CFR § 1.129(b))          |          |
| 1801                      | 770           | 2801 | 385 Request for Continued Examination (RCE)                                   |          |
| 1802                      | 900           | 1802 | 900 Request for expedited examination of a design application                 |          |
| Other fee (specify) _____ |               |      |   |          |

\*Reduced by Basic Filing Fee Paid

SUBTOTAL (3)

(\$)

## SUBMITTED BY

Complete (if applicable)

|                   |                 |                                   |        |           |                  |
|-------------------|-----------------|-----------------------------------|--------|-----------|------------------|
| Name (Print/Type) | Sujit B. Kotwal | Registration No. (Attorney/Agent) | 43,336 | Telephone | 650-326-2400     |
| Signature         | S. B. Kotwal    |                                   |        | Date      | October 21, 2003 |

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

60065326 v1

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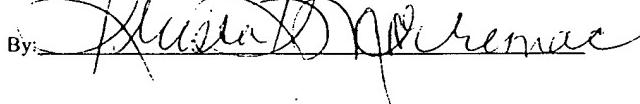
I hereby certify that this correspondence is being facsimile  
transmitted to the United States Patent and Trademark Office, to Linzy T.  
McCartney, at Fax No. (703) 872-9314.

PATENT

Attorney Docket No.: 21751-002200US

TOWNSEND and TOWNSEND and CREW LLP

By:



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

DAVID E. BARAFF et al.

Application No.: 09/851,940

Filed: May 10, 2001

For: GLOBAL INTERSECTION  
ANALYSIS FOR DETERMINING  
INTERSECTIONS OF OBJECTS IN  
COMPUTER ANIMATION

Customer No.: 20350

Confirmation No.: 4048

Examiner: Linzy T. McCartney

Technology Center/Art Unit: 2671

AMENDMENT

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed July 21, 2003, please enter the following  
amendments and remarks:

**Amendments to the Specification** begin on page 2 of this paper.

**Amendments to the Claims** are reflected in the listing of claims which begins on page 4 of this  
paper.

**Remarks/Arguments** begin on page 17 of this paper.

**COPY**

**Amendments to the Specification:**

Please replace paragraph [0010] beginning on pg. 3 with the following paragraph:

--[0010] In addition, in section 3.2.1 of the above-cited paper, the authors also attempt to examine the cloth in a small neighborhood near the intersection of an edge through a face, as a part of the method. The system takes a majority vote to determine which side is the correct side for the cloth to be on. However, this is a local examination, not a global one. Thus intersection intersections outside of this small neighborhood are not considered. Additionally, the method of the cited paper relies only on statistics; their method forces the cloth to choose "yes, I'm right" or "no, I should be on the other side." Such a systems allow system allows each portion of the cloth to have an equal weight and thus the portions that have the "wrong" orientation effect the determination as much as those portions that have the "correct" orientation.--

Please replace paragraph [0034] on pg. 10 with the following paragraph:

--[0034] The intersections analyzed herein involve either intersections of a surface (strictly speaking, a 2-manifold) with itself or another surface. The case of a curve intersecting a surface (which is applicable when colliding hair or fur with a character's skin) is trivially handled by the methods described. It is noted that the cases of intersection of meshes at a point or by intersection of a whole plane are not addressed herein and do not occur in the normal process of computer animation. Such intersection intersections do not occur because random noise is added to the meshes so that the chances of intersections occurring where an intersection path is not formed are infinitesimal---

Please replace paragraph [0037] on pg. 11 with the following paragraph:

--[0037] A pair of surfaces may intersect in several manners. The surfaces may not intersect, the surfaces may intersect once, as shown in Fig. 3, or they may intersect multiple times, as shown in Fig. 4. A surface may also intersect itself; however, self-intersections come

**COPY**

in two different forms. The self-intersection may result in two closed intersection paths, as shown in Fig. 5. This occurs when the surface deforms so that two distinct regions of the one surface intersect. In contrast, Fig. 6 shows a self-intersection that results on only one closed intersection path. In this case, the surface has deformed so that a single region has been folded on top of itself.[[.]]--

Please replace paragraph [0042] on pg. 12 with the following paragraph:

--[0042] The computational methods required to implement the above steps are all straightforward, except for the step of determining which vertices lie on the "inside" of a path, versus those which lie "outside" the path. First, it is noted that it is not clear what the "inside" versus the "outside" of an intersection path is. Are the vertices on the blue mesh in Fig. 3b really the "inside" of the intersection path? It is just as valid to say that the uncolored vertices on the blue surface are surrounded by the intersection path. Second, an intersection path may intersects intersect itself, as shown in Figs. 7a and 7B (or even worse). Such *non-simple* paths may or may not define an inside and an outside set of vertices.--

**COPY**

**Amendments to the Claims:**

Claims 1-24 have been amended. New claims 25-30 have been added. This listing of claims will replace all prior versions, and listings of claims in the application:

**Listing of Claims:**

- 1           1. (Currently Amended) A method of analyzing intersections between objects in computer animation comprising ~~the steps of~~:
  - 3                 providing a plurality of objects represented by a plurality of meshes, with each of said plurality of objects being represented by one of said plurality of meshes and each of said meshes being formed by a set of vertices, where a set of pairs of vertices of said set of vertices define a set of edges;
  - 7                 checking all edges of said meshes to determine if said set of edges of said meshes intersect with any of said plurality of meshes;
  - 9                 tracing an intersection path formed by intersection of said edges with any of said plurality of meshes; and
  - 11                 determining which vertices of said meshes are contained within said intersection path; ~~and~~ ~~and setting a polarity of each of said contained vertices to indicate that those vertices are contained within said intersection path.~~  
~~setting a polarity of each vertex contained within said intersection path to indicate that said vertex is contained within said intersection path, wherein a polarity of a vertex is set based upon a number of disconnected regions formed by said intersection path.~~
- 1           2. (Currently Amended) [[A]] ~~The method of analyzing intersections between objects according to claim 1 wherein said step of determining which vertices of said meshes are contained within said intersection path comprises examining vertices of a mesh that contains said intersection path within a certain distance from a particular edge of said intersection path and characterizing said vertices to determine which vertices of said meshes are contained within said intersection path.~~

**COPY**

1           3. (Currently Amended) [[A]] The method of analyzing intersections between  
2 ~~objects according to claim 1 wherein said step of determining which vertices of said meshes are~~  
3 contained within said intersection path comprises the steps of:

4           selecting an arbitrary edge of a mesh that crosses said intersection path, where  
5 said arbitrary edge is formed by vertices  $u$  and  $v$  and where said mesh contains said intersection  
6 path;

7           performing a search of said mesh, radiating from one of said vertices  $u$  and  $v$ ,  
8 identifying all vertices in all of said edges that cross said intersection path, and defining the set of  
9 vertices identified as a playpen;

10          tracing said intersection path and identifying vertices, within said playpen, on a  
11 left side of said intersection path as left and retracing said intersection path in an opposite  
12 direction and identifying vertices, with said playpen, on a right side of said intersection path as  
13 right;

14          determining whether vertices adjacent to vertices identified as left and right lie  
15 outside of said playpen;

16          discarding said intersection path when at least one of both left and right identified  
17 vertices lie outside said playpen;

18          determining whether at least one vertex adjacent to said right identified vertices  
19 lies outside said playpen; and

20          changing said polarity of characterizing each of said left identified vertices to  
21 ~~indicate that those vertices are as~~ contained within said intersection path when at least one vertex  
22 adjacent to said right identified vertices lies outside said playpen and changing said polarity of  
23 characterizing each of said right identified vertices to indicate that those vertices are as contained  
24 within said intersection path when at least one vertex adjacent to said left identified vertices lies  
25 outside said playpen.

1           4. (Currently Amended) [[A]] The method of analyzing intersections between  
2 ~~objects according to claim 1 wherein said intersection path is a self-intersection with the~~  
3 ~~intersection path being contained in a single mesh and wherein said step of setting a polarity of~~

COPY

4 each vertex of said contained vertices to indicate that those vertices are contained within said  
5 intersection path comprises: setting the  
6 associating a first color of said vertices that are with each vertex that is contained  
7 within said intersection path to a predetermined color when the intersection yields one region;  
8 and  
9 when the intersection yields first and second disconnected regions, setting the  
10 associating a second color of vertices of a first portion of with each vertex contained in said first  
11 disconnected region and associating a third color with each vertex contained in the second  
12 disconnected region. said single mesh contained within said intersection path to a first color and  
13 setting the color of vertices of a second portion of said single mesh contained within said  
14 intersection path to a second color when the intersection yields two unconnected regions.

1 5. (Currently Amended) [[A]] The method of analyzing intersections between  
2 objects according to claim 1 wherein said intersection path is an intersection between a first  
3 mesh and a second mesh and said step of wherein setting a polarity of each vertex of said  
4 contained vertices to indicate that those vertices are contained within said intersection path  
5 comprises setting the associating a first color [[of]] with vertices of the first mesh contained  
6 within said intersection path to a first color and setting the associating a second color [[of]] with  
7 vertices of the second mesh contained within said intersection path to a second color.

1 6. (Currently Amended) [[A]] The method of analyzing intersections between  
2 objects according to one of claims claim 4 and 5, further comprising displaying said objects on a  
3 computer display with vertices colored as said vertices have been set displayed in colors  
4 associated with the vertices.

1 7. (Currently Amended) A method of determining pinching between objects in  
2 computer animation comprising the steps of:

3 providing a plurality of objects represented by a plurality of meshes, with each of  
4 said plurality of objects being represented by one of said plurality of meshes and each of said  
5 meshes being formed by a set of vertices;

**COPY**

6           determining an intersection path formed by analyzing intersections between said  
7    objects and changing a polarity of each of a plurality vertices contained in an intersection path  
8    created by an intersection of said plurality of meshes;

9           setting a polarity of each vertex contained within said intersection path based  
10   upon a number of disconnected regions formed by said intersection path;

11           selecting a particular vertex of said set of vertices bound between surfaces of said  
12    objects and closer to one of said surfaces, where said surfaces have defined insides and outsides  
13    and said particular vertex is inside of both surfaces;

14           determining whether any vertices inside of said surfaces have their polarities set;  
15    and

16           indicating that said particular vertex is pinched when any vertices inside of said  
17    surfaces have their polarities set.

1           8. (Currently Amended) [[A]] The method of determining pinching between  
2    objects in computer animation according to claim 7 further comprising the step of:

3           constraining motion of said pinched particular vertex when motion in said  
4    computer animation is simulated.

1           9. (Currently Amended) [[A]] The method of determining pinching between  
2    objects in computer animation according to claim 7 wherein said step of changing setting a  
3    polarity of each vertex of a plurality vertices contained in an intersection path comprises setting  
4    the associating a color of each of a plurality vertices with each vertex contained in an the  
5    intersection path, the method and further comprising the step of:

6           displaying said objects on a computer display with vertices colored as said  
7    vertices have been set displayed in colors associated with the vertices such that an animator can  
8    see the intersection and pinching of said objects is visually displayed.

1           10. (Currently Amended) A method of simulating motion of objects in computer  
2    animation, the method comprising the steps of:

**COPY**

3           providing a plurality of objects represented by a plurality of meshes, with each of  
4    said plurality of objects being represented by one of said plurality of meshes and each of said  
5    meshes being formed by a set of vertices, where at least one of said objects is an animated object  
6    and at least one of said objects is a simulated object;

7           positioning said objects at some time  $t$  to provide one frame of said computer  
8    animation;

9           determining an intersection path formed by analyzing intersections between said  
10    objects and setting a polarity of each of a plurality vertices contained in an intersection path  
11    created by an intersection of said plurality of meshes;

12           setting a polarity of each vertex contained within said intersection path based  
13    upon a number of disconnected regions formed by said intersection path;

14           setting a simulated force between vertices of said at least one simulated object  
15    based on the polarity set for said vertices of said at least one simulated object; and

16           advancing the computer animation to a time  $t + \Delta t$  and simulating motions of said  
17    objects using said simulated force to simulate motions of said at least one simulated object.

1           11. (Currently Amended) [[A]] The method of simulating motion of objects in  
2    computer animation according to claim 10 wherein

3           when said intersection path is a self-intersection with the intersection path  
4    contained in a single mesh, said step of setting a polarity of each vertex contained within said  
5    polarity of each of said plurality vertices contained in said intersection path comprises setting the  
6    associating a first color of with each vertex contained within said intersection path of said  
7    plurality vertices to a predetermined color when the intersection yields one region and when the  
8    intersection yields first and second disconnect regions, associating a second color with each  
9    vertex contained in said first disconnected region and a third color with each vertex contained in  
10   the second disconnected region, setting the color of vertices of a first portion of said single mesh  
11   contained within said intersection path to a first color and setting the color of vertices of a second  
12   portion of said single mesh contained within said intersection path to a second color when the  
13   intersection yields two unconnected regions, and

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14           when said intersection path is an intersection between a first mesh and a second  
15    mesh, ~~and said step of setting a polarity of each vertex of said plurality of vertices contained in~~  
16    said intersection path comprises ~~setting the associating the second color of each of said plurality~~  
17    ~~vertices of with each vertex of the first mesh contained within said intersection path and~~  
18    ~~associating a third color with each vertex of the second mesh contained within said intersection~~  
19    ~~path, to said first color and setting the color of each of said plurality vertices of the second mesh~~  
20    ~~to said second color.~~

1           12. (Currently Amended) [[A]] ~~The method of simulating motion of objects in~~  
2    ~~computer animation according to claim 11 wherein said step of setting a simulated force between~~  
3    vertices of said at least one simulated object comprises:

4           setting said simulated force to cause an attraction between vertices of said at least  
5    one simulated object when said vertices are ~~set to associated with said first or second or third~~  
6    colors;

7           setting said simulated force to cause [[an]] a repulsion between vertices of said at  
8    least one simulated object when said vertices are not ~~set to associated with said first color, said~~  
9    ~~second color, or predetermined said third color colors; and~~

10          setting said simulated force to cause neither ~~an~~ attraction or a repulsion between  
11    vertices of said at least one simulated object when said vertices are ~~set to associated with said~~  
12    ~~predetermined first color.~~

1           13. (Currently Amended) A computer program product ~~comprising: stored on a~~  
2    ~~computer usable readable medium having computer readable program code means embodied in~~  
3    ~~said medium for causing a computer to manipulate and analyze for processing computer~~  
4    generated objects, said computer readable program code means product comprising:

5           ~~means code for providing a plurality of objects represented by a plurality of~~  
6    meshes, with each of said plurality of objects being represented by one of said plurality of  
7    meshes and each of said meshes being formed by a set of vertices, where a set of pairs of vertices  
8    of said set of vertices define a set of edges;

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9           means code for checking all edges of said meshes to determine if said set of edges  
10          of said meshes intersect with any of said plurality of meshes;

11           means code for tracing an intersection path formed by intersection of said edges  
12          with any of said plurality of meshes; and

13           means code for determining which vertices of said meshes are contained within  
14          said intersection path; ~~and~~ ~~and setting a polarity of each of said contained vertices to indicate~~  
15          ~~that those vertices are contained within said intersection path.~~

16           code for setting a polarity of each vertex contained within said intersection path to  
17          indicate that said vertex is contained within said intersection path, wherein a polarity of a vertex  
18          is set based upon a number of disconnected regions formed by said intersection path.

1           14. (Currently Amended) [[A]] The computer program product according to of  
2          claim 13 wherein ~~said means the code~~ for determining which vertices of said meshes are  
3          contained within said intersection path comprises means code for examining vertices of a mesh  
4          that contains said intersection path within a certain distance from a particular edge of said  
5          intersection path and means for characterizing said vertices to determine which vertices of said  
6          meshes are contained within said intersection path.

1           15. (Currently Amended) [[A]] The computer program product according to of  
2          claim 13 wherein ~~said means the code~~ for determining which vertices of said meshes are  
3          contained within said intersection path comprises:

4           means code for selecting an arbitrary edge of a mesh that crosses said intersection  
5          path, where said arbitrary edge is formed by vertices  $u$  and  $v$  and where said mesh contains said  
6          intersection path;

7           means code for performing a search of said mesh, radiating from one of said  
8          vertices  $u$  and  $v$ , identifying all vertices in all of said edges that cross said intersection path, and  
9          defining the set of vertices identified as a playpen;

10           means code for tracing said intersection path and identifying vertices, within said  
11          playpen, on a left side of said intersection path as left and retracing said intersection path in an

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12 opposite direction and identifying vertices, with said playpen, on a right side of said intersection  
13 path as right;

14           means code for determining whether vertices adjacent to vertices identified as left  
15 and right lie outside of said playpen;

16           means code for discarding said intersection path when at least one of both left and  
17 right identified vertices lie outside said playpen;

18           means code for determining whether at least one vertex adjacent to said right  
19 identified vertices lies outside said playpen; and

20           means code for changing said polarity of characterizing each of said left identified  
21 vertices ~~to indicate that those vertices are as~~ contained within said intersection path when at least  
22 one vertex adjacent to said right identified vertices lies outside said playpen and changing said  
23 polarity of characterizing each of said right identified vertices ~~to indicate that those vertices are~~  
24 ~~as~~ contained within said intersection path when at least one vertex adjacent to said left identified  
25 vertices lies outside said playpen.

1           16. (Currently Amended) [[A]] The computer program product according to of  
2 claim 13 wherein said intersection path is a self-intersection with the intersection path being  
3 contained in a single mesh and said means the code for setting a polarity of each vertex of said  
4 ~~contained vertices to indicate that those vertices are contained within said intersection path~~  
5 comprises: means for setting the

6           code for associating a first color of said vertices that are with each vertex that is  
7 ~~contained within said intersection path to a predetermined color~~ when the intersection yields one  
8 region; and

9           when the intersection yields first and second disconnected regions, means code  
10 ~~for setting the associating a second color with each vertex contained in said first disconnected~~  
11 ~~region and associating a third color with each vertex contained in the second disconnected~~  
12 ~~region. of vertices of a first portion of said single mesh contained within said intersection path to~~  
13 ~~a first color and setting the color of vertices of a second portion of said single mesh contained~~

**COPY**

14        ~~within said intersection path to a second color when the intersection yields two unconnected~~  
15        ~~regions.~~

1            17. (Currently Amended) [[A]] The computer program product according to of  
2        ~~claim 13 wherein said intersection path is an intersection between a first mesh and a second mesh~~  
3        ~~and said means of the code for setting a polarity of each vertex of said contained vertices to~~  
4        ~~indicate that those vertices are contained within said intersection path comprises means code for~~  
5        ~~setting the associating a first color [[of]] with vertices of the first mesh contained within said~~  
6        ~~intersection path to a first color and code for associating a second setting the color [[of]] with~~  
7        ~~vertices of the second mesh contained within said intersection path to a second color.~~

1            18. (Currently Amended) [[A]] The computer program product according to of  
2        ~~claim 16-one of claims 16 and 17, further comprising means code for displaying said objects on a~~  
3        ~~computer display with vertices colored as said vertices have been set displayed in colors~~  
4        associated with the vertices.

1            19. (Currently Amended) A computer program product ~~comprising:~~ stored on a  
2        ~~computer usable readable medium having computer readable program code means embodied in~~  
3        ~~said medium for causing a computer to manipulate and analyze processing computer generated~~  
4        ~~objects in computer animation, said computer readable program product code means comprising:~~

5            ~~means code for providing a plurality of objects represented by a plurality of~~  
6        ~~meshes, with each of said plurality of objects being represented by one of said plurality of~~  
7        ~~meshes and each of said meshes being formed by a set of vertices;~~

8            ~~means code for determining an intersection path formed by analyzing~~  
9        ~~intersections between said objects and means for changing a polarity of each of a plurality~~  
10      ~~vertices contained in an intersection path created by an intersection of said plurality of meshes;~~  
11      ~~code for setting a polarity of each vertex contained within said intersection path~~  
12      based upon a number of disconnected regions formed by said intersection path;

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13           means code for selecting a particular vertex of said set of vertices bound between  
14 surfaces of said objects and closer to one of said surfaces, where said surfaces have defined  
15 insides and outsides and said particular vertex is inside of both surfaces;

16           means code for determining whether any vertices inside of said surfaces have  
17 their polarities set; and

18           means code for indicating that said particular vertex is pinched when any vertices  
19 inside of said surfaces have their polarities set.

1           20. (Currently Amended) [[A]] The computer program product according to of  
2 claim 19 further comprising:

3           means code for constraining motion of said pinched particular vertex when  
4 motion in said computer animation is simulated.

1           21. (Currently Amended) [[A]] The computer program product according to of  
2 claim 19 wherein said means for changing the code for setting a polarity of each vertex of a  
3 plurality vertices contained in an said intersection path comprises means code for setting the  
4 associating a color of each of a plurality vertices with each vertex contained in an said  
5 intersection path, the computer program product and further comprising[[::]] means code for  
6 displaying said objects on a computer display with vertices displayed in colors associated with  
7 the vertices colored as said vertices have been set such that an animator can see the intersection  
8 and pinching of said objects is visually displayed.

1           22. (Currently Amended) A computer program product comprising: stored on a  
2 computer readable usable medium having computer readable program code means embodied in  
3 said medium for causing a computer to manipulate and analyze for processing computer  
4 generated objects in computer animation, said computer readable program product code means  
5 comprising:

6           means code for providing a plurality of objects represented by a plurality of  
7 meshes, with each of said plurality of objects being represented by one of said plurality of

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8 meshes and each of said meshes being formed by a set of vertices, where at least one of said  
9 objects is an animated object and at least one of said objects is a simulated object;  
10           means code for positioning said objects at some time  $t$  to provide one frame of  
11 said computer animation;  
12           means code for determining an intersection path formed by analyzing  
13 intersections between said objects and setting a polarity of each of a plurality vertices contained  
14 in an intersection path created by an intersection of said plurality of meshes;  
15           code for setting a polarity of each vertex contained within said intersection path  
16 based upon a number of disconnected regions formed by said intersection path;  
17           means code for setting a simulated force between vertices of said at least one  
18 simulated object based on the polarity set for said vertices of said at least one simulated object;  
19 and  
20           means code for advancing the computer animation to a time  $t + \Delta t$  and simulating  
21 motions of said objects using said simulated force to simulate motions of said at least one  
22 simulated object.

1           23. (Currently Amended) [[A]] The computer program product according to of  
2 claim 22 wherein  
3           when said intersection path is a self-intersection with the intersection path  
4 contained in a single mesh, said means code for setting a polarity of each vertex contained within  
5 said polarity of each of said plurality vertices contained in said intersection path comprises  
6 means code for associating a first color with each vertex contained within said intersection path  
7 setting the color of each of said plurality vertices to a predetermined color when the intersection  
8 yields one region and when said intersection path yields first and second disconnected regions,  
9 code for associating a second color with each vertex contained in said first disconnected region  
10 and a third color with each vertex contained in the second disconnected region, setting the color  
11 of vertices of a first portion of said single mesh contained within said intersection path to a first  
12 color and setting the color of vertices of a second portion of said single mesh contained within

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13        ~~said intersection path to a second color when the intersection yields two unconnected regions,~~  
14        and

15            when said intersection path is formed from an intersection between a first mesh  
16        and a second mesh, the code for said means for setting a polarity of each vertex of said plurality  
17        of vertices contained in said intersection path comprises means code for setting the associating  
18        the second color of each of said plurality vertices with each vertex of the first mesh ~~to said first~~  
19        ~~color and setting the associating the third color with of each of said plurality vertices vertex~~ of  
20        the second mesh ~~to said second color~~.

1            24. (Currently Amended) [[A]] The computer program product according to of  
2        claim 23 wherein said means for the code for setting a simulated force between vertices of said at  
3        least one simulated object comprises:

4            means code for setting said simulated force to cause an attraction between vertices  
5        of said at least one simulated object when said vertices are set to associated with said first or  
6        second or third colors;

7            means code for setting said simulated force to cause [[an]] a repulsion between  
8        vertices of said at least one simulated object when said vertices are not set to associated with said  
9        first color, said second color, or predetermined said third color colors; and

10            means code for setting said simulated force to cause neither an attraction or a  
11        repulsion between vertices of said at least one simulated object when said vertices are set to  
12        associated with said predetermined first color.

1            25. (New) The method of claim 5, further comprising displaying said objects  
2        on a computer display with vertices displayed in colors associated with the vertices.

1            26. (New) The computer program product of claim 17, further comprising  
2        code for displaying said objects on a computer display with vertices displayed in colors  
3        associated with the vertices.

1            27. (New) A method of analyzing intersections, the method comprising:

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2           determining an intersection path formed by an intersection of a first mesh portion  
3 and a second mesh portion, wherein each mesh portion comprises a plurality of vertices;  
4           determining a set of vertices of the first mesh portion and the second mesh portion  
5 that are contained within the intersection path; and  
6           setting a value for each vertex in the set of vertices based upon based upon a  
7 number of disconnected regions formed by said intersection path.

1           28. (New) The method of claim 27 wherein the first mesh portion and the  
2 second mesh portion are portions of a mesh representing an object.

1           29. (New) The method of claim 27 wherein the first mesh portion is a portion  
2 of a first mesh representing a first object and the second mesh portion is a portion of a second  
3 mesh representing a second object.

30. (New) The method of claim 27 wherein setting a value for each vertex in  
the set of vertices comprises:

              setting each vertex in the set of vertices to a first value if a single region is formed  
by the intersection path; and

              if the intersection path forms a first region on the first mesh portion and a second  
region on the second mesh portion that is disconnected from the first region,

              setting each vertex in the set of vertices that is in the first region to a  
second value, and

              setting each vertex in the set of vertices that is in the second region to a  
third value.

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**REMARKS/ARGUMENTS**

**STATUS OF THE APPLICATION**

Claims 1-24 were pending in this application and examined.

Claims 3, 12, 15, and 24 are objected to as being dependent upon a rejected base claim, but are deemed allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims.

Claims 1, 2, 13, and 14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Volino et al., "Accurate Collision Response on Polygonal Meshes" [hereinafter "Volino\_Accurate"] in view of Volino et al., "Collision and Self-Collision Detection: Efficient and Robust Solutions for Highly Deformable Surfaces" [hereinafter "Volino\_Collision"]. Claims 5 and 17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Volino\_Accurate in view of Volino\_Collision and further in view of Yaeger (U.S. Patent 5,515,489) [hereinafter "Yaeger"]. Claims 4, 6, 16, and 18 are rejected under 35 U.S.C. §103(a) as being unpatentable over Volino\_Accurate in view of Volino\_Collision and further in view of Kommrusch et al. (U.S. Patent 5,444,838) [hereinafter "Kommrusch"]. Claims 7, 9, 19, and 21 are rejected under 35 U.S.C. §103(a) as being unpatentable over Volino\_Accurate in view of Volino\_Collision and further in view of Rossignac et al., "Interactive Inspection of Solids: Cross-sections and Interferences" [hereinafter "Rossignac"]. Claims 8 and 20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Volino\_Accurate in view of Volino\_Collision and further in view of Rossignac and Jeff Lander "Skin Them Bones: Game Programming for the Web Generation" [hereinafter "Lander"]. Claims 10 and 20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Volino\_Accurate in view of Volino\_Collision and further in view of Lafleur et al., "Cloth Animation with Self-Collision Detection" [hereinafter "Lafleur"]. Claims 11 and 23 are rejected under 35 U.S.C. §103(a) as being unpatentable over Volino\_Accurate in view of Volino\_Collision and further in view of Lafleur and Kommrusch.

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Applicants have amended claims 1-24. New claims 25-30 have been added. Applicants submit that no new subject matter has been introduced by the amendments. Claims 1-30 remain pending in this application after filing of this amendment.

### THE SPECIFICATION

The specification has been amended to correct inadvertently introduced typographical errors. Applicants submit that no new subject matter has been introduced by the amendments.

### THE CLAIMS

#### Rejections under 35 U.S.C. 103

##### Claim 1

Applicants submit that the features of the present invention recited in independent claim 1, as amended, are not made obvious by the cited references. Claim 1, as amended, recites:

1. A method of analyzing intersections between objects in computer animation comprising the steps of:

determining which vertices of said meshes are contained within said intersection path; and

setting a polarity of each vertex contained within said intersection path to indicate that said vertex is contained within said intersection path, wherein a polarity of a vertex is set based upon a number of disconnected regions formed by said intersection path. (Applicants' claim 1, as amended, emphasis added).

As recited above, the polarity of each vertex contained within the intersection path is set based upon the number of disconnected regions formed by the intersection path. The setting of polarities for vertices based upon the number of regions formed by an intersection path is explained in the Application specification in paragraph [0041] on page 12. The specification states that

If an intersection path arises from a situation as depicted in either Fig. 3b or Fig. 5b, then there are two such regions. Arbitrarily, the vertices in one region are assigned the "color" black<sub>i</sub> and the vertices in the other region are given the color white<sub>i</sub>. If the intersection is a self-

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intersection that yields a single region, as in Fig. 6, then all the vertices in that one region are marked as having color red<sub>i</sub>. A vertex is allowed to have an arbitrary number of colors. (Excerpt from paragraph [0041] on pg. 12)

Accordingly, various polarity values (e.g., "white<sub>i</sub>" or "black<sub>i</sub>", or "red<sub>i</sub>") may be associated with a vertex based upon whether the intersection path forms a single connected region (as in Fig. 6) or multiple disconnected regions (as in Figs. 3b or Fig. 5b)--i.e., based upon the number of disconnected regions formed by the intersection path.

As described in the specification, the polarities associated with the vertices may be used in various different applications such as to simulate motion of objects in response to collisions (Specification: pgs. 14, 15), pinch detection (Specification: pgs. 15, 16), to determine correct orientation in motion simulation programs (Specification: pgs. 16, 17), etc.

Applicants submit that the above-described concept recited in claim 1 is not taught or suggested by the cited references, considered individually or in combination.

Volino\_Accurate teaches a general geometrical method for enforcing collisions. There is no teaching or suggestion of setting polarities for vertices within an intersection path based upon the number of disconnected regions formed by the intersection path. In fact, Volino\_Accurate does not even attempt to identify the number of regions formed by an intersection path.

Volino\_Collision also does not teach or suggest such a concept. Volino\_Collision teaches an algorithm for detecting collisions, including self collisions, and techniques for evaluating collision inside-outside orientation. Volino\_Collision provides techniques for determining if an element is at the correct side of a surface or at the other side (See Volino\_Collision: Section 3 on pg. 7). The in-out orientation is updated according to the moves of the objects (See Volino\_Collision: Section 3.1 on pg. 7).

Applicants submit that Volino\_Collision also does not attempt to identify the number of regions formed by an intersection path. As a result, Volino\_Collision also does not teach or suggest setting polarities for the vertices based upon the number of regions. Applicants submit that determination of the inside-outside orientation taught by Volino\_Collision is not the same as setting polarities for the vertices as recited in claim 1 of the application. In

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Volino\_Collision, the "most probable" orientation for a collision region is determined by considering statistically the individual collision orientations. Then, the common collision orientation is given for every collision (See Volino\_Collision: Section 3.2 on pgs. 8 and 9). Unlike the present invention recited in claim 1, there are no polarities set for the vertices in Volino\_Collision can then used for various applications as described in the present application. Accordingly, the orientations set in Volino\_Collision (either "correct side" or "other side") are not that same as polarities. Accordingly, Applicants respectfully submit that claim 1 as amended is not taught or suggested by Volino\_Collision.

On the contrary, Applicants submit that the remnance techniques taught in Volino\_Collision are similar to the prior art techniques described in the Application specification that make use of "history" (i.e., based upon past positions and orientations), rely on statistics, and take the majority vote to determine which side is the correct side for the cloth to be on (See Application specification pgs. 3 and 4, and Volino\_Collision sections 3.0, 3.1, and 3.2). This is substantially different from the invention recited in claim 1.

Applicants thus submit that claim 1, as amended, is not taught or suggested by Volino\_Collision.

Applicants further submit that other cited references (i.e., Yaeger, Kommrusch, Rossignac, Lander, and Lafleur) also fail to teach or suggest setting of polarities of vertices based upon the number of disconnected regions formed by an intersection path. Accordingly, Applicants submit that the cited references considered individually do not teach or suggest the invention as recited in claim 1. Further, even if the references were combined, the resultant combination would fail to teach such a concept as recited in claim 1.

Accordingly, Applicants submit that claim 1, as amended, is in a condition for allowance.

Claims 2-24

Applicants respectfully submit that claims 2-6 that depend from claim 1 should be allowed for at least a similar rationale as discussed above for allowing claim 1, and others.

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Appl. No. 09/851,940  
Amdt. dated October 21, 2003  
Reply to Office Action of July 21, 2003

PATENT

Independent claims 7, 10, 13, 19, and 22 have been amended to include the feature of claim 1 described above. Accordingly, Applicants submit that claims 7, 10, 13, 19, and 22 should be allowed for at least a similar rationale as discussed above for allowing claim 1, and others. Dependent claims 8-9, 11-12, 14-18, 20-21, and 23-24 should be allowed for at least a similar rationale as discussed for allowing the independent claim from which they depend.

New Claims

Applicants submit that new claims 25-30 are also allowable. Claims 25 and 26 represent dependent claims corresponding to previously pending multiple dependent claims 6 and 18.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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60063915 v2

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**REVOCATION OF POWER OF  
ATTORNEY OR  
AUTHORIZATION OF AGENT**

|                        |                 |
|------------------------|-----------------|
| Application Number     | 09/851,940      |
| Filing Date            | May 10, 2001    |
| First Named Inventor   | David Baraff    |
| Art Unit               | 2671            |
| Examiner Name          | L.T. McCartney  |
| Attorney Docket Number | 021751-002200US |

I hereby revoke all previous powers of attorney or authorizations of agent given in the above-identified application:

A Power of Attorney or Authorization of Agent is submitted herewith.

**OR**

Please change the correspondence address for the above-identified application to:

Customer Number 20350



**OR**

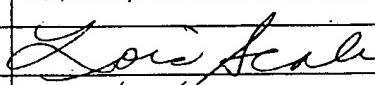
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| City   |       |     |  |
| Country  | State | ZIP |  |
| Telephone  | Fax   |     |  |

I am the:

Applicant/Inventor.

Assignee of record of the entire interest. See 37 CFR 3.71.  
*Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)*

**SIGNATURE of Applicant or Assignee of Record**

|           |   |           |              |
|-----------|---|-----------|--------------|
| Name      | Lois Scali, Executive Vice President and General Counsel, Pixar                     |           |              |
| Signature |  |           |              |
| Date      | 18/16/03  | Telephone | 510-752-3000 |

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below\*.

\*Total of forms are submitted.

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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|                        |   |
|------------------------|---|
| Application Number     | 09/851,940  |
| Filing Date            | May 10, 2001  |
| First Named Inventor   | David Baraff  |
| Title                  | Global Intersection Analysis for Determining Intersections of Objects in Computer Animation |
| Art Unit               | 2671  |
| Examiner Name          | L.T. McCartney  |
| Attorney Docket Number | 021751-002200US   |

I hereby appoint:

 Practitioners at Customer Number

OR

 Practitioner(s) named below:

20350



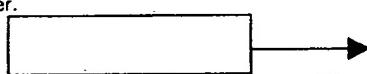
| Name | Registration Number |
|------|---------------------|
|      |                     |
|      |                     |

as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.

Please change the correspondence address for the above-identified application to:

 The above-mentioned Customer Number.

OR

 Practitioners at Customer Number

|   |                                    |
|---|------------------------------------|
| <input checked="" type="checkbox"/> Firm or Individual Name | Townsend and Townsend and Crew LLP |
|---|------------------------------------|

Address Two Embarcadero Center

Address Eighth Floor

City San Francisco State CA ZIP 94111

Country United States

Telephone 415.576.0200 Fax 415.576.0300

I am the:

 Applicant/Inventor. Assignee of record of the entire interest. See 37 CFR 3.71.

Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

## SIGNATURE of Applicant or Assignee of Record

Name Lois Scali, Executive VP and General Counsel, Pixar

Signature

Date 10/16/02 Telephone 510-752-3000

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

 \*Total of forms are submitted.

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60059900 v1

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**STATEMENT UNDER 37 CFR 3.73(b)**Applicant/Patent Owner: David Baraff et al.Application No./Patent No.: 09/851,940 Filed/Issue Date: May 10, 2001Entitled: Global Intersection Analysis for Determining Intersections of Objects in Computer AnimationPixar dba Pixar Animation Studios, a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1.  the assignee of the entire right, title, and interest; or
2.  an assignee of less than the entire right, title and interest.  
The extent (by, percentage) of its ownership interest is \_\_\_\_\_ %

in the patent application/patent identified above by virtue of either:

A.  An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

**OR**

B.  A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as shown below:

1. From: \_\_\_\_\_ To: \_\_\_\_\_  
The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

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The document was recorded in the United States Patent and Trademark Office at  
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The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet.

Copies of assignments or other documents in the chain of title are attached.

[NOTE: A separate copy (i.e., the original assignment document or a true copy of the original document) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the USPTO. See MPEP 302.8]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

10/16/03

\_\_\_\_\_  
Date  
510 752-3000  
\_\_\_\_\_  
Telephone number

Lois Scali

Typed or printed name

Lois Scali

Signature

Executive Vice President and General Counsel

Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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60019173 v1

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**U.S. ASSIGNMENT**

IN CONSIDERATION of the sum of One Dollar (\$1.00); and of other good and valuable consideration paid to the undersigned inventor(s) (hereinafter ASSIGNOR) by

[Insert  
ASSIGNEE's  
Name(s)  
Address(es)]

PIXAR ANIMATION STUDIOS

---



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---

(hereinafter ASSIGNEE), the receipt of which is hereby acknowledged, the undersigned ASSIGNOR hereby sells, assigns and transfers to ASSIGNEE the entire and exclusive right, title and interest to the invention entitled

[Title of  
invention]

GLOBAL INTERSECTION ANALYSIS FOR DETERMINING INTERSECTIONS OF OBJECTS IN  
COMPUTER ANIMATION

---

(\*If the assignment  
is being filed  
after the filing of the  
application, this  
section must be  
completed)

for which application for Letters Patent of the United States was executed on even date herewith unless otherwise indicated below:

\*filed on \_\_\_\_\_, Serial No. \_\_\_\_\_

(Arent Fox Kintner Plotkin & Kahn is hereby authorized to insert the series code, serial number and/or filing date hereon, when known)

and all Letters Patent of the United States to be obtained therefor on said application or any continuation, division, renewal, substitute, reissue or reexamination thereof for the full term or terms for which the same may be granted.

The ASSIGNOR agrees to execute all papers necessary in connection with application and any continuing, divisional, reissue or reexamination applications thereof and also to execute separate assignments in connection with such applications as the ASSIGNEE may deem necessary or expedient.

The ASSIGNOR agrees to execute all papers necessary in connection with any interference, litigation, or other legal proceeding which may be declared concerning this application or any continuation, division, reissue or reexamination thereof or Letters Patent or reissue patent issued thereon and to cooperate with the ASSIGNEE in every way possible in obtaining and producing evidence and proceeding with such interference, litigation, or other legal proceeding.

IN WITNESS WHEREOF, the undersigned inventor(s) has (have) affixed his/her/their signature(s).

[Signature(s)  
of Assignor(s)]

David E. Baraff  
(SIGNATURE)  
  
Andrew Witkin  
(SIGNATURE)  
  
Michael Kass  
(SIGNATURE)  
  
(SIGNATURE)

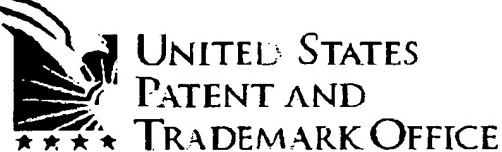
|                 |          |
|-----------------|----------|
| David E. Baraff | 5/1/2001 |
| (TYPE NAME)     | (DATE)   |
| Andrew Witkin   | 5/1/2001 |
| (TYPE NAME)     | (DATE)   |
| Michael Kass    | 5/1/2001 |
| (TYPE NAME)     | (DATE)   |
| (TYPE NAME)     | (DATE)   |

|             |
|-------------|
| 5/1/2001    |
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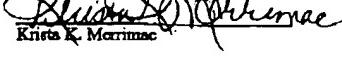
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| OCT. 21. 2003 1:11PM  | TTC-PA 650-326-2422 | NO. 736 P.1         |
| Atty Docket No. 21751-002200US  |                     |                     |
| <b>PTO FAX NO.:</b> (703) 872-9314<br><b>ATTENTION:</b> Examiner Linzy T. McCartney<br><b>TELEPHONE NO.:</b> (703) 605-0745   |                     | Group Art Unit 2671 |
| <b>OFFICIAL COMMUNICATION</b><br><b>AMENDMENT, REVOCATION OF POWER OF</b><br><b>ATTORNEY, POWER OF ATTORNEY, STATEMENT</b><br><b>UNDER 3.73(B) FOR FOR ENTRY IN U.S. PATENT</b><br><b>APPLICATION NO. 09/851,940, FILED MAY 10, 2001</b>  |                     |                     |
| <b>FOR THE PERSONAL ATTENTION OF</b><br><b>EXAMINER LINZY T. MCCARTNEY</b>  |                     |                     |
| <b>CERTIFICATION OF FACSIMILE TRANSMISSION</b>  |                     |                     |
| <p>I hereby certify that the following document(s) in re Application of DAVID E. BARAFF et al., U.S. Application No. 09/851,940, filed May 10, 2001 for GLOBAL INTERSECTION ANALYSIS FOR DETERMINING INTERSECTIONS OF OBJECTS IN COMPUTER ANIMATION are being facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.</p>  |                     |                     |
| <u>Document(s) Attached</u> <ul style="list-style-type: none"> <li>1. SB/21 Transmittal Form (1 page)</li> <li>2. SB/17 Fee (in duplicate) (2 pages)</li> <li>3. Amendment (21 pages)</li> <li>4. Revocation of Power of Attorney or Authorization of Agent (1 page)</li> <li>5. Power of Attorney or Authorization of Agent (1 page)</li> <li>6. Statement Under 3.73(b) w/ copy of Assignment as filed (2 pages)</li> </ul> |                     |                     |
| Number of pages being transmitted, including this page: 20<br>Dated: October 21, 2003<br><br>Krista K. Marinac  |                     |                     |
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